Data communications system, computer, and data communications
method for parallelly operating standard-based and proprietary
resources

5   the invention relates to a data communications system in
     accordance with the preamble of Claim 1, a computer for use in
     a data communications systems as well as a data communications
     method in accordance with the preamble of Claim 18.

     Data transmission over the Internet is becoming ever more
10   important. The Internet is a worldwide data network or
     consists - to put it more precisely - of a plurality of
     different data networks connected to one another via a what
     are known as routers.

     In the Internet one or more central computers in each case
15   communicates with clients arranged remotely from them, e.g. a
     stationary or portable computer, a telephone etc. (and/or with
     further central computers).

     Communication is undertaken by using what are known as
     Internet protocols, especially the Transmission Control
20   Protocol (TCP) and the Internet Protocol (IP), abbreviated to
     TCP/IP.

     To this end for example software is loaded on to each client
     and each central computer which understands the TCP/IP
     protocol and can evaluate it (socket or TCP/IP stack).

25   Ever more private data networks (i.e. generally only able to
     be used by specific authorized persons) are based on the
     technology and the concept of the Internet. These types of
     data network of called Intranets.

     In an Intranet - as in the Internet - for example a

corresponding central computer - using Internet protocols,
especially the TCP/IP protocol - communicates with clients
arranged remotely from it, e.g. stationary or portable
computers, telephones, etc. (and/ or with further central

5   computers).

For transmission of the corresponding Intranet data, said data
is subdivided into individual packets in each case and then
sent asynchronously.

In this way it is possible for example for two clients
10   connected to the Intranet to exchange voice and/or image data,
e.g. to telephone each other " (VoIP = Voice over IP), i.e. to
exchange voice telephony data and/or image telephony data etc.

Furthermore - more than two, e.g. three, four or five -
clients can hold a telephone or video conference over the
15   Intranet.

In this case a computer connected to the Intranet functions as
a conference control unit, that is as a "mixer desk" in order
to merge or mix the voice and/or video telephony data sent by
the clients participating in the conference separately to the
20   computer in each case and then to send the corresponding -
mixed - data via the Intranet to the corresponding (remaining)
clients participating in the conference.

For exchange of the telephone or video conference data an
"open" or standardized protocol based on the TCP/IP protocol,
25   for example the H.323 protocol, can be used.

Alternatively, instead of an individual computer functioning
as a conference control unit, a number of conference control
computers can also be provided in an Intranet, with each of
the computers - based on the above standard protocol,
30   especially the H.323 protocol - at a particular point for a

maximum predetermined number of clients to operate as a
"mixing desk" or to be able to function as a conference
control unit for a predetermined number of telephone or video
conferences.

5   If - because of the overloading - one of the conference
     control unit computers cannot process a request originating
     from specific clients for executing a telephone or video
     conference, another conference control unit computer then
     takes over control of the corresponding telephone or video
10   conference. (i.e. functions for the relevant clients as
     conference control unit, especially as "mixing desk").

     Intranets can be connected to the Internet by means of an
     appropriate central computer, and/or via the same or via a
     further central computer, e.g. an appropriate
15   telecommunication system, especially a PBX (PBX = Private
     Branch Exchange) to the telephone network.

     Data communication over the telephone network can for example
     be undertaken on the basis of POTS (Plain Old Telephone
     Service), or for example on the basis of ISDN (Integrated
20   Services digital Network) data transmission protocols or for
     example on the basis of xDSL (x digital Subscriber Line) data
     transmission protocols, e.g. by means of ADSL data
     transmission (ADSL = Asynchronous Digital Subscriber Line).

     With the aid of the telecommunications system or the PBX
25   computer it is made possible for specific clients connected to
     the Intranet, e.g. telephones, to communicate with external
     devices connected to a telephone network, e.g. telephones.

     For communication between the PBX computer and the clients a
     proprietary protocol based for example on the TCP/IP protocol
30   can be used.

if a telephone conference is to be held between a number
(especially more than two, e.g. three, four or five) external
and/or internal TDM or PCM clients or devices, the relevant
PBX computer can function as a conference control unit,

5   especially as a "mixing desk" in order to merge or mix the
(speech) data sent from the various clients or devices
participating in the conference separately to the PBX computer
and then to send the corresponding - mixed - data to the
appropriate (remaining) clients or devices taking part in the

10 conference, especially telephones.

The object of the invention is to make available an innovative
data communications system, an innovative computer as well as
an innovative data communications method.

It achieves this and further objectives by the objects of

15 Claims 1, 17 and 18.

Advantageous developments of the invention are specified in
the subclaims.

In accordance with the basic idea of the invention a data
communications system with a number of clients is made

20 available, with a telephone and/or video-conference data
processing unit which supports a specific first data
transmission protocol being provided, and a data processing
unit supporting both of the first and the second data
transmission protocol converting the received data and

25 forwarding it to the telephone and/or video conference data
processing unit such that clients which support both first and
also the second data transmission protocol can be used.

Advantageously the second data transmission protocol can be an
open, standardized protocol, e.g. an H.323 or H.225/H.245-

30 based protocol, and the first data transmission protocol a
proprietary or generic protocol e.g. a PCM or TDM-based

protocol.

This makes it possible - unlike in the prior art - to operate
H.323 standard-based and proprietary, e.g. PCM or TDM-based
resources, in parallel.

5   The invention is explained in more detail below with reference
to a number of exemplary embodiments and the enclosed drawing.

The diagrams show:

Fig. 1:   a schematic diagram of a data communications system
           in accordance with an exemplary embodiment of the
10   invention; and

Fig. 2:   a schematic diagram of the structure and the
           operation of a communication control computer used in
           the system shown in Figure 1.

In the data communications system 1 shown in Figure 1 a
15   plurality (e.g. 5 - 300, especially 10 - 150) clients 2a, 2b,
2c, 3a, 3b, e.g. a number of telephones 3a, 3b, and number of
computers 2a, 2b, 2c, are connected to a first Intranet data
network A.

The first Intranet data network A features a
20   telecommunications system or a central computer 5 functioning
as a telecommunications system, especially a PBX computer (PBX
= Private Branch Exchange) which functions as a communication
control device for clients 2a, 2b, 2c, 3a, 3b, especially as a
telephone switching system in order to connect the first
25   Intranet data network A (or the clients 2a, 2b, 2c, 3a, 3b
connected to it) with a telephone network (e.g. with the
public telephone network).

The connection of the central computer 5 or the clients 2a,
2b, 2c, 3a, 3b to the first Intranet data network A can for

example be undertaken by lines 6a, 6b, 6c, 7a, 7b, 9 connected
to a corresponding bus system.

The Clients 2a, 2b, 2c, 3a, 3b and the central computer 5
communicate - as explained in greater detail below - using
5   Internet protocols, e.g. the Transmission Control Protocol
(TCP) or the Internet Protocol (IP), abbreviated to TCP/IP.

To this end for example software (known as a stack) is loaded
onto the relevant client 2a, 2b, 2c, 3a, 3b or onto the
central computer 5, which can understand and interpret the
10   corresponding Internet protocol.

For transmission of data between the clients 2a, 2b, 2c, 3a,
3b and the central computer 5 over the first Intranet data
network A this data - as is usual with Internet protocols - is
divided up into individual packets.

15   If one of the clients 2a, 2b, 2c, 3a, 3b communicates - via
the telephone network - with a corresponding external device
not connected directly to the first Intranet data network A
(e.g. a telephone 10a, 10b, 10c), the corresponding data sent
(by the relevant client 2a, 2b, 2c, 3a, 3b in the above way,
20   i.e. as Internet protocol-based data, is converted by the
central computer 5 into corresponding POTS (Plain Old
Telephone Service), ISDN (Integrated Services digital
Network), or xDSL- (x digital Subscriber Line) data and is
output over a line 11 to the telephone network (or conversely
25   the ISDN or POTS data received from the relevant telephones
10a, 10b, 10c over the telephone network is forwarded by the
central computer 5 in the above-mentioned way via the Intranet
data network A to the relevant Client 2a, 2b, 2c, 3a, 3b).

As shown in more detail in Fig. 1, the Intranet data network
30   can be connected via the telecommunication system or the
central computer 5 - not only to the telephone network - but

also (if necessary) to the Internet (and this can be done -
indirectly - over the telephone network and a computer 5a of a
ISP (Internet Service Provider)).

Should one of the clients 2a, 2b, 2c, 3a, 3b communicate with
5   a device connected to the Internet, e.g. a computer 10d, 10e,
a telephone connection is established by the central computer
5 (e.g. a POTS, ISDN, or xDSL, especially ADSL connection) to
the ISP computer 5a, which then assigns to the central
computer 5 or to the relevant client 2a, 2b, 2c, 3a, 3b a
10   temporary IP address (Internet Protocol address) and causes a
corresponding Internet connection to be set up (so that then -
over the Internet, and the telephone network (and through the
intermediate connection of the ISP computer 5a, and of the
central computer 5) data can be exchanged between the relevant
15   client 2a, 2b, 2c, 3a, 3b, and the relevant computer 10d,
10e).

In accordance with FIG. 1 the data communications system 1 -
apart from the first Intranet data network A - features a
plurality of further Intranet data networks connected or
20   connectable to the first Intranet data network A, e.g. a
second Intranet data network B, and a third Intranet data
network C, etc.

The second and third Intranet data network B, C each feature -
just like the first Intranet data network A - a plurality
25   (e.g. 5 - 300, especially 10 - 150) clients 12a, 12b, 12c,
13a, 13b, e.g. a number of telephones 13a, 13b, and a number
of computers 12a, 12b, 12c.

The second and third Intranet data network B, C are also - as
well as being connected to the above telephone network -
30   connected to the Internet, and are connected, by contrast with
the first Intranet data network A, directly and permanently
e.g. by means of corresponding (fixed) dedicated connections

19a, 19b.

The second and third Intranet data network B, C each feature -
in the same way as the first Intranet data network A, a
telecommunications system in each case or a central computer
5   operating as a telecommunications system 15a, 15b, especially
a PBX computer (PBX = Private Branch Exchange) which operates
as a communication network control device for the clients 12a,
12b, 12c, 13a, 13b, especially as a switching device in order
to connect the Intranet data network (or the clients 12a, 12b,
10   12c, 13a, 13b connected to it) to the telephone network or the
Internet. The relevant central computer 15a, 15b is
permanently connected to the Internet via the corresponding
dedicated connection 19a, 19b (i.e. permanently "online).

The connection of the relevant central computer 15a, 15b or
15   the clients 12a, 12b, 12c, 13a, 13b to the second or third
Intranet data network B, C can for example be made in the same
way as for the first Intranet data network A by means of lines
16a, 16b, 16c, 17a, 17b, 9b, 9c connected·to a corresponding
bus system.

20   The clients 12a, 12b, 12c, 13a, 13b and the relevant central
computer 15a, 15b communicate - as will be explained in more
detail below - by using Internet protocols, e.g. the
Transmission Control Protocol (TCP) or the Internet Protocol
(IP), abbreviated to TCP/IP.

25   To this end for example software (known as a stack) is loaded
onto the relevant client 12a, 12b, 12c, 13a, 13b or onto the
relevant central computer 15a or 15b which can understand and
interpret the corresponding Internet protocol.

If one of the clients 12a, 12b, 12c, 13a, 13b communicates
30   with a corresponding external device not connected directly to
the Intranet data network but connected to the telephone

network (e.g. the above-mentioned telephone 10b), the
corresponding data sent (by the relevant client 12a, 12b, 12c,
13a, 13b in the above way, i.e. Internet protocol-based) will
be converted by the relevant central computer 15a, 15b into
5   corresponding POTS, ISDN or xDSL data output to the telephone
network via a line 9a, 9d (or conversely the POTS, ISDN or
xDSL data received by the telephone 10b over the a telephone
network will be forwarded by the relevant central computer
15a, 15b in the above way via the Intranet data network B, C
10   to the relevant client 12a, 12b, 12c, 13a, 13b).

The relevant central computer 15a, 15b or the clients 12a,
12b, 12c, 13a, 13b connected to it have a permanent address -
consisting of a multidigit number - (Internet Protocol
address), so that, after the corresponding Internet connection
15   is established, data can be exchanged between a corresponding
device connected to the Internet, e.g. the above-mentioned
computer 10d, and the relevant central computer 15a, 15b or -
by interconnecting the relevant central computer 15a, 15b -
between the relevant device connected to the Internet, e.g.
20   the computer 10d, and the relevant client 12a, 12b, 12c, 13a,
13b.

As is also shown in Fig. 1, the data communications system 1 -
alternatively - can feature one at more central computers 8,
18a, 18b each connected by corresponding lines 6d, 16d, 16e to
25   the relevant Intranet data network A, B, C (or to the
corresponding bus system) (shown by dashed lines in Figure 1),
which - in the conventional way known per se, can be used as
control units for executing the corresponding telephone and/or
video conferences (but which can also - as explained in more
30   detail below - can be dispensed with with the present data
communications system 1, or for which the function can be
taken over by the above telecommunications systems or central
PBX computers 5, 15a, 15b).

The corresponding central computer 8, 18a, 18b operates in one
function as a "mixing desk" in order to merge the voice and/or
video telephony data sent by the various clients participating
in the conference (e.g. the clients 2a, 2b, 12a) over the
5   corresponding Intranet data networks A, B, C separately in
each case to the corresponding central computer 8, 18a, 18b,
and then to send the corresponding mixed data over the
relevant Intranet data networks A, B, C to the corresponding
(remaining) clients 2a, 2b, 12a participating in a conference.

10 · For data transmission or for control of the data transmission
in this case an "open" or standardized protocol based on the
TCP/IP protocol is used, for example the H.225/H.245 or H.323
protocol.

To this end software must be loaded on a memory device (not
15   shown here) of the corresponding clients 2a, 2b, 12a or
central computer 8, 18a, 18b which supports the corresponding
H.225/H.245 or H.323 protocol (in particular can understand it
and evaluate it).

Each central computer 8, 18a, 18b can – at a specific point in
20   time – functions for a maximum predetermined number of clients
2a, 2b, 12a as a "mixing desk" or for a maximum predetermined
number of telephone or video conferences to be conducted
simultaneously as a conference control unit.

If – as a result of overloading – a request made to the
25   central computer 8, 18a, 18b by specific clients 2a, 2b, 12a
for processing a telephone or video conference cannot be
processed, another central computer 8, 18a, 18b then takes
over the control of the corresponding telephone or video
conference (i.e. operates for the relevant clients 2, 2b, 12a
30   as a conference control unit, especially as a "mixing desk").

As will be explained in more detail below, for the data

communications system 1 shown in Figure 1 for communication
between the corresponding PBX computers 5, 15a, 15b (PBX =
Private Branch Exchange) and the relevant clients 2a, 2b, 2c,
3a, 3b, 12a, 12b, 12c, 13a, 13b - parallel - e.g. both a
5 company-specific proprietary protocol based on the TCP/IP
protocol can be used (e.g. a generic protocol of Siemens AG),
for example a corresponding conventional TDM or PCM protocol
(TDM = Time Division Multiple, PCM = Pulse Code Modulation),
and an "open" or standardized protocol - also based on the
10 TCP/IP protocol - e.g. the above-mentioned H.225/H.245 or
H.323 protocol (which is why the PBX computer 5, 15a, 15b - as
is clear from the following presentation - can take over one
of the corresponding functions of the central computer 8, 18a,
18b as control unit for executing the corresponding,
15 H.225/H.245- or H.323 protocol-based and/or TDM/PCM protocol-
based telephone and/or video conferences (i.e. the central
computer 8, 18a, 18b can - alternatively - be dispensed
with)).

As shown in Fig. 2, the PBX computers (here: the PBX computer
20 15a, and correspondingly also the - constructed and set up in
the same way as PBX computer 15a - PBX computers 5, 15b)
feature for this purpose at least one module 20a which takes
over the function of the gateway (or a number, e.g. between
two and seven, gateway modules 20b, which are constructed and
25 set up in a similar way to gateway module 20a), as well as a
(especially precisely one) module 21 which takes over a
gatekeeper function.

The PBX computer 15a is embodied in the present exemplary
embodiment as a proprietary computer system (i.e. as an
30 "embedded system°), alternatively an embodiment as a (non-
proprietary PC system is for example also conceivable.

The gateway module 20a, 20b is set up so that it communicates

- both with the gatekeeper-module 21 (cf. arrow Q), and also
with the corresponding clients 2a, 2b, 2c, 3a, 3b, 12a, 12b,
12c, 13a, 13b (cf. arrow R) - (exclusively) via the above
generic or proprietary protocol based on the TCP/IP protocol,
5   especially the TDM or PCM protocol.

To this end software must be loaded on a memory device (not
shown here) of the gateway module 20a, 20b, especially a
TDM/PCM switching matrix access device 23a, 23b, which
supports the corresponding TDM/PCM protocol (i.e. can
10   understand and evaluate it).

As is also shown in Figure 2, the gateway module 20a, 20b
features a data processing device 22a, 22b which has a DSP,
especially an MMP (DSP = Digital Signal Processor; MMP = Multi
Media processor), which - via the TDM/PCM switching matrix
15   access device 23a, 23b - is connected to the TDM/PCM switching
matrix (so that the gateway module 20a, 20b, especially the
MMP data processing device 22a, 22b, can communicate with the
gatekeeper module 21 - arrow Q - or with one or more clients
2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a, 13b - arrow R).

20   If a telephone and/or video conference is to be held between a
number (especially more than two, e.g. three, four or five)
        internal clients 12a, 12b, 12c, 13a, 13b (i.e. clients
12a, 12b, 12c, 13a, 13b contained in the same Intranet data
network B as the central control PBX computer 15a controlling
25   the communication in each case) and/or external clients 2a,
2b, 2c, 3a, 3b (i.e. clients 2a, 2b, 2c, 3a, 3b contained in
an Intranet data network A, C other than the central control
PBX computer 15a controlling the communication in each case),
as explained in more detail below - the gateway module 20a
30   provided in the relevant PBX computer 15a (if nec.
correspondingly selected by the gatekeeper module 21)
(especially the MMP data processing device 22a) operates as a

"mixing desk", in order to merge or to mix the voice or image
data sent separately in each case to the PBX computer 15a by
the clients 2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a, 13b
participating in the conference.

5   In this case the data can be sent from the corresponding
clients 2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a, 13b -
depending on whether they support the above "open" or
standardized, H.225/H.245 or H.323 protocol, or the above
proprietary or generic TDM/PCM protocol - in any way in
10   accordance either H.225/H.245- or H.323 protocol-based or
TDM/PCM protocol based (in which case - for transmission based
on an H.225/H.245 or H.323 protocol - the data (unlike the
data transmitted with the TDM/PCM protocol) is not directly
evaluated by the gateway module 20a (as is correspondingly
15   shown by the arrow R), but on the gatekeeper module 21 is
first converted into the corresponding TDM/PCM protocol-based
data, and then forwarded to the gateway module 20a (as is
correspondingly shown by the arrow S and the arrow Q)).

The - correspondingly mixed - data is always output by the
20   gateway module 20a in the form of TDM/PCM protocol-based data
(in which case - before the sending of the data to only
clients 2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a, 13b that
support the above standardized, H.225/H.245 or H.323 protocol,
but not the above proprietary or generic TDM/PCM protocol -
25   the data (unlike for clients 2a, 2b, 2c, 3a, 3b, 12a, 12b,
12c, 13a, 13b that support the TDM/PCM protocol) is not
forwarded directly to the corresponding clients
(correspondingly shown by the arrow R), but is first converted
by the gatekeeper module 21 into the corresponding H.225/H.245
30   or H.323 protocol-based data and only then forwarded to the
corresponding clients 2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a,
13b (correspondingly shown by the arrow S and the arrow Q)) -
the corresponding protocols or the protocol selection will

thus be "encapsulated" by the gatekeeper module 21.

As well as the above-mentioned "mixing desk" function, the
gateway module 20a fulfills for all clients provided,
especially involved in the relevant communications network
5   process, e.g. the corresponding telephone and/or video
conference, clients 2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a,
13b what is known as a "Music On Hold" function (MoH function
i.e. plays at appropriate points - e.g. during the switching
process - for the corresponding clients 2a, 2b, 2c, 3a, 3b,
10   12a, 12b, 12c, 13a, 13b, the appropriate voice or tone signals
stored on a memory device not shown in the diagram (or the
corresponding image signals) (e.g. an interim melody).

Furthermore - as already explained above - the corresponding
gateway module 20a (especially the TDM/PCM switching matrix
15   access module 23a provided there) looks after the transmission
of the data to, or the receipt of the data from, the TDM/PCM
switching matrix network (e.g. - via the line 9b - over the
internal Intranet data network B, or - for example via the
line 9a - over the external telephone network). (By contrast
20   an interface device 24 provided at the gatekeeper module 20b
takes care - as required - of either TDM/PCM or H.225/H.245
protocol-based data transmission (e.g.-- via the line 9b - via
the internal Intranet data network B, or - for example via the
line 19a - externally over the Internet)).

25   The control of the gateway module 20a (as well as of the
further gateway modules 20b provided if necessary, and - where
necessary further resources in the data communications system
1 for executing the corresponding telephone and/or video
conferences, or suitable as a mixing desk e.g. TDM/PCM-based
30   "resources", especially of gateway modules existing (e.g. in
the further Intranet data networks A, C) - if these are just
available -) is undertaken by an IP network control device 25

or an IP Network Controller (IPNC) provided in the gatekeeper
module 21 (and this is done - as shown in Figure 2 by the
arrow Q - by sending corresponding TDM/PCM protocol-based
control data).

5   Correspondingly the control of corresponding H.225/H.245 or
H.323 protocol based "resources" - present in the relevant
Intranet data network B, e.g. of resources just available -
provided by the above-mentioned central computer 18a and if
necessary of further - just available - H.225/H.245- or H.323
10 protocol-based resources in the data communications system 1
for executing the corresponding telephone and/or video
conferences or suitable as a mixing desk, especially the above
resources in the further Intranet data networks A, C (or for
example in the Internet) made available by the central
15 computer 8, 18b, are also controlled by the network control
device provided in the gatekeeper module 21 (and this is done
- as shown in Figure 2 by the arrow S - by sending the
corresponding H.225/H.245 or H.323 protocol-based control
data).

20 The PBX computer 15a, especially the gatekeeper module 21 can
thus access under the control of the IP network Controller 25
- (as required) both resources present in the relevant
Intranet data networks B, i.e. "locally" as well as remote
resources available in other Intranet data networks A, B or
25 which can be called up via the Internet or the telephone
network (and can optionally do this for example by using the
H.225/H.245 protocol, or for example the TDM/PCM protocol -
which enables both H.323 protocol and also TDM/PCM protocol-
based resources to be used).

30 Each "resource" (i.e. each gateway-module 20a, 20b, each
computer 8, 18a, 18b, etc.) can - at a particular point in
time - be used for a maximum predetermined number of clients

2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a, 13b as a "mixing desk"
(or - at a particular point in time - undertake the
appropriate data processing for a maximum predetermined number
of telephone or video conferences).

5   The resources are allocated - at the corresponding request of
the clients 2a, 2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a, 13b -
(depending on the load at the time or the availability of
resources) by a resource control device 26 featuring a
resource management (RM) device 27 and a Call Processing (CP)
10 device 28) - communicating with the above network control
device 25.

If - as a result of an overload - a corresponding resource
cannot process a request originating from specific clients 2a,
2b, 2c, 3a, 3b, 12a, 12b, 12c, 13a, 13b for executing a
15 telephone or video conference, the gatekeeper module 21 (or
more precisely the resource control device 26 via the IP
network control device 25), by sending the corresponding
TDM/PCM or H.225/H.245 or H.323 protocol-based control data,
causes another of the above resources to take over the
20 corresponding telephone or video conference (i.e. functions as
a "mixing desk" for the relevant clients 2a, 2b, 2c, 3a, 3b,
12a, 12b, 12c, 13a, 13b).

Uniform resource management is achieved in this way,
independent of the type and of the location of the connected
25 resources, or a uniform system control interface for control
or both H.323 standard and also TDM/PCM-based, proprietary
resources.

In this case, by the modularization/splitting of the
gatekeeper and gateway functions onto different modules, H.323
30 stack license costs can be saved.